

Claims

1. A plate package for a plate heat exchanger, which includes at least two plate modules (2) each including at least two heat exchanger plates (3), which each has a primary side (3') and a secondary side (3'') and is compression-moulded to extend at at least an intermediate plane (a), an upper plane (b) and a lower plane (c) with respect to the primary side, which planes (a, b, c) are substantially parallel to each other,
- wherein said two heat exchanger plates (3) are permanently connected to each other in such a way that the heat exchanger plates form an inner first space (11) between the secondary sides (3'') of the heat exchanger plates,
- wherein said plate modules (2) are mounted adjacent to each other and form a second space (12) between each other,
- wherein each heat exchanger plate (3) includes a first porthole (13) and a second porthole (14), which are arranged to permit communication with the first space (11),
- wherein each first and second portholes (13, 14) is defined by a port edge (31) and surrounded by a ring groove (32), which is adapted to receive a gasket member (22, 46) and provided at the primary side (3') at a distance from the port edge (31),
- wherein the ring groove (32) is formed by a bottom (33), which is substantially positioned at the level of said intermediate plane (a), an inner lateral limitation (34) that extends upwardly from the bottom in a direction towards the port edge (31) and around the bottom (33) and an outer lateral limitation (35) that extends upwardly from the bottom away from the port edge and around the bottom (33),
- characterised in that the outer lateral limitation (35) forms a surface which extends without any interruptions substantially continuously around the whole bottom (33) and that the inner lateral limitation (34) has a discontinuous extension around the bottom (33) and includes interruptions along this extension.

2. A plate package according to claim 1, characterised in that each heat exchanger plate (3) includes an inner border area (36) at each first and second portholes (13, 14), wherein the inner border area (36) extends around the port edge (31) between the inner port edge and the inner lateral limitation (34) and wherein the inner border area (36) includes a plurality of lower portions (37) which form said interruptions and extend from the bottom (33) and through the inner lateral limitation (34).
- 10 3. A plate package according to claim 2, characterised in that said lower portions (37) are positioned substantially at the level of the lower plane (c).
- 15 4. A plate package according to claim 3, characterised in that the heat exchanger plates (3) in said plate module (2) are arranged in such a way that the heat exchanger plates (3) at the secondary side (3'') abut each other at said lower portions (37).
- 20 5. A plate package according to any one of the claims 2 to 4, characterised in that said lower portions (37) extend up to the port edge (31).
- 25 6. A plate package according to any one of claims 2 to 5, characterised in that the inner border area (36) beside said lower portions (37) includes a plurality of upper portions (38) which are located at a level above said intermediate plane (a) in such a way that the inner border area (36) includes lower portions (37) and upper portions (38) in an alternating order.
- 30 7. A plate package according to claim 6, characterised in that said upper portions (38) are located at a level which lies just below the upper plane (b).
- 35 8. A plate package according to any one of the preceding claims, characterised in that each heat exchanger plate (3) includes an outer border area (39) which extends around the outer lateral limitation (35) immediately outside the outer lateral limitation (35),

wherein the outer border area (39) has an upper ring-shaped surface which is located at the level of the upper plane (b).

5 9. A plate package according to any one of the preceding claims, characterised in that the bottom (33) of the ring groove (32) in a cross-section has a somewhat concave shape seen from the primary side (3').

10 10. A plate package according to claim 9, characterised in that the bottom at said cross-section has a central, substantially plane portion (43) which extends around the ring groove (32), an inner inclined portion (44), which extends around the ring groove towards the inner lateral limitation (34), and an outer inclined portion (45), which extends around the ring groove towards the outer lateral
15 limitation (35).

20 11. A plate package according to any one of the preceding claims, characterised in that the gasket member includes a ring gasket (22) having an elongated cross-sectional shape.

25 12. A plate package according to any one of the preceding claims, characterised in that the gasket member includes two ring gaskets (46), which each has a substantially circular cross-sectional shape in a non-compressed state.

30 13. A plate package according to any one of the preceding claims, characterised in that the gasket member includes an attachment member (47) for attachment of the gasket member in the ring groove (32).

14. A plate package according to claim 13, characterised in that said attachment member (47) extends inwardly towards the porthole (13, 14) and engages the port edge (31).

35 15. A plate heat exchanger including a plate package (2) according to any one of claims 1-14.

16. A plate module for a plate package for a plate heat exchanger, wherein the plate module (2) includes at least two heat exchanger plates (3), which each has a primary side (3') and a secondary side (3'') and is compression-moulded to extend at at least an intermediate plane (a), an upper plane (b) and a lower plane (c) with respect to the primary side, which planes (a, b, c) are substantially parallel to each other, wherein said two heat exchanger plates (3) are permanently connected to each other in such a way that the heat exchanger plates form an inner first space (11) between the secondary sides (3'') of the heat exchanger plates, wherein each heat exchanger plate (3) includes a first porthole (13) and a second porthole (14), which are arranged to permit communication with the first space (11), wherein each first and second portholes (13, 14) are defined by a port edge (31) and surrounded by a ring groove (32), which is adapted to receive a gasket member (22, 46) and provided at the primary side (3') at a distance from the port edge (31), wherein the ring groove (32) is formed by a bottom (33), which is substantially positioned at the level of said intermediate plane (a), an inner lateral limitation (34) that extends upwardly from the bottom in a direction towards the port edge (31) and around the bottom (33) and an outer lateral limitation (35) that extends upwardly from the bottom away from the port edge and around the bottom (33), characterised in that the outer lateral limitation (35) forms a surface which extends without any interruptions substantially continuously around the whole bottom (33) and that the inner lateral limitation (34) has a discontinuous extension around the bottom (33) and includes interruptions along this extension.

17. A plate module according to claim 16, characterised in that the plate module is adapted to be mounted adjacent to a similar plate module in a plate package for forming a second space between the plate modules.

18. A plate module according to any one of claims 16 and 17, characterised in that each heat exchanger plate (3) includes an inner border area (36) at each first and second portholes (13, 14), wherein the inner border area (36) extends around the port edge (31) between the port edge and the inner lateral limitation (34) and wherein the inner border area (36) includes a plurality of lower portions (37) which form said interruptions and extends from the bottom (33) through the inner lateral limitation (34).
19. A plate module according to claim 18, characterised in that said lower portions (37) are positioned substantially at the level of the lower plane (c).
20. A plate module according to any one of claims 18 and 19, characterised in that said lower portions (37) extend up to the port edge (31).
21. A plate module according to any one of claims 18 to 20, characterised in that the inner border area (36) beside said lower portions (37) includes a plurality of upper portions (38) which are positioned at a level above said intermediate plane (a) in such a way that the inner border area (36) includes lower portions (37) and upper portions (38) in an alternating order.
22. A plate module according to claim 21, characterised in that said upper portions (38) are located at a level which lies just below the upper plane (b).
23. A plate module according to any one of claims 16 to 22, characterised in that each heat exchanger plate (3) includes an outer border area (39) which extends around the outer lateral limitation (35) immediately outside the outer lateral limitation (35), wherein the outer border area (39) has an upper ring-shaped surface located at the level of the upper plane (b).
24. A plate module according to any one of the preceding claims, characterised in that the bottom (33) of the ring groove (32) in a

cross-section has a somewhat concave shape seen from the primary side (3').

25. A plate module according to claim 24, characterised in that said bottom at said cross-section has a central substantially plane portion (43) which extends around the ring groove (32), an inner inclined portion (44), which extends around the ring groove to the inner lateral limitation (34), and an outer inclined portion (45), which extends around the ring groove to the outer lateral limitation (35).